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THE COMMISSION FOR THE INVESTIGATION AND CONTROL OF THE
CHESTNUT TREE BLIGHT DISEASE IN PENNSYLVANIA

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THE CHESTNUT TREE

METHODS AND SPECIFICATIONS

FOR THE

UTILIZATION OF BLIGHTED CHESTNUT

BULLETIN No. 6

AUGUST 15, 1913

Pennsylvania Chestnut Tree Blight Commission.

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THE CHESTNUT TREE.

The genus *Castanea*, or chestnut, contains four distinct species, two of which are found in the United States, and two in Europe and Japan. Of the two species found in the United States, one is a shrub or small tree, the chinquapin, and the other is our native American sweet chestnut (*Castanea dentata*). Some botanists recognize a third species in the United States, this being *Castanea alnifolia*, which is found only in the Southern states and which is only a small shrub.

Reproduction.

Chestnut reproduces from seed and by stump sprouts. Sprouts grow more rapidly than seedlings and produce what is known as second-growth chestnut. Chestnut is the American species best adapted for regeneration by sprouts, known as coppice. Stumps of any diameter may put forth sprouts. Coppice chestnut from twenty to forty years old will yield telephone poles, posts, railroad ties, extract wood, etc.

Some Uses of Chestnut.

The following are some of the important uses of chestnut:

Telephone and telegraph poles; railroad, trolley and mine ties; extract wood, fuel wood, charcoal wood, kindling; paper pulp, in mixture with other woods; construction timbers; sills, especially when placed in the ground; fence posts, stakes, rails and paling; staves and heading for barrels and kegs; mine material, props, lagging timbers, brattice boards; boxes and crates; shingles; lath; furniture, as chairs, built-in sideboards, tables, beds, church pews, organs, pianos, billiard tables and fixtures; cabinet making; interior finish—doors, door and window frames, wainscoting, beams, picture molding, panels, base boards, ceiling, etc.; flooring; vine and hop poles; carriages and parts of automobile bodies; tubes for water pipes; caskets and rough boxes; agricultural implements; veneer cores; veneer; gymnasium goods; toys; musical instruments; car sills and frames; show cases, bank and barber-

shop fixtures and sewing machines; ribs of ships; brush backs; trunks; tie plugs, etc.

The fruit is an article of food, both in its raw state and when manufactured into meal and flour. Its leaves are used in the manufacture of medicine.

CHESTNUT POLES.

KINDS.

Telegraph, telephone, trolley.

TELEPHONE POLES.

Telephone poles are usually classified according to the size of the poles, and to the number of wires which they are intended to carry. There are two general classes of poles: firsts and seconds. Some electric companies, however, make as many as four classes. Poles are usually required to be perfectly sound, squared at both ends, reasonably straight, well proportioned from butt to top, peeled, and to have the knots trimmed to the surface of the pole.

Pole dimensions consist of length, top circumference and circumference taken six feet from the butt. Poles are variously classified, according to the requirements of the consumer.

FIRST-CLASS POLES			SECOND-CLASS POLES		
Length of Pole	Top Circumference	Circumference 6 Feet from Butt	Length of Pole	Top Circumference	Circumference 6 Feet from Butt
25 feet	24 to 25 inches	33 to 36 inches	20 feet	22 inches	30 inches
30 "	24 to 25 "	36 to 40 "	25 "	22 "	31 to 33 "
35 "	24 to 25 "	40 to 43 "	30 "	22 "	32 to 36 "
40 "	24 to 25 "	43 to 45 "	35 "	22 "	34 to 40 "
45 "	24 to 25 "	47 to 48 "	40 "	22 "	38 to 43 "
50 "	24 to 25 "	50 to 51 "	45 "	22 "	43 to 47 "
55 "	22 to 25 "	53 to 54 "	50 "	22 "	47 to 50 "
60 "	22 to 25 "	56 to 57 "	55 "	22 "	53 "
65 "	22 to 25 "	59 to 60 "	60 "	22 "	56 "
70 "	22 "	63 "	65 "	22 "	59 "
75 "	22 "	66 "	70 "	22 "	62 "

Some electric companies make two more classes, with specifications as follows:

Third-Class Poles			Fourth-Class Poles		
Length of Pole	Top Circumference	Circumference 6 Feet from Butt	Length of Pole	Top Circumference	Circumference 6 Feet from Butt
25 feet	20 inches	30 inches	25 feet	20 inches	27 inches
30 "	20 "	33 "	30 "	20 "	31 "
35 "	20 "	36 "	35 "	20 "	35 "
40 "	20 "	40 "	40 "	20 "	39 "
45 "	20 "	43 "	45 "	20 "	43 "
50 "	20 "	46 "	50 "	20 "	46 "
55 "	20 "	49 "			

The following table gives the length of poles that may be obtained from average trees of different diameters. This is based on a table in Bulletin 53, U. S. Forest Service, "Chestnut in Southern Maryland." The tenths of inches in the original table have usually been placed in the nearest inch or half-inch class, and were in a few cases disregarded so that the figures given would compare with the average pole specifications:

Size of Pole from Tree.

Diameter Breast-high (D. B. H.)	Length of Pole	Diameter at Top	Diameter 6 Feet from Butt
11 inches	25 feet	8 inches	$10\frac{1}{2}$ inches
12 "	30 "	8 "	$11\frac{1}{2}$ "
13 "	35 "	8 "	$12\frac{1}{2}$ "
14 "	35 "	$8\frac{1}{2}$ "	$13\frac{1}{2}$ "
15 "	40 "	$8\frac{1}{2}$ "	$14\frac{1}{2}$ "
16 "	40 "	$8\frac{1}{2}$ "	$15\frac{1}{2}$ "
17 "	45 "	$8\frac{1}{2}$ "	$16\frac{1}{2}$ "
18 "	45 "	$8\frac{1}{2}$ "	$17\frac{1}{2}$ "
19 "	50 "	$8\frac{1}{2}$ "	18 "
20 "	50 "	$8\frac{1}{2}$ "	$19\frac{1}{2}$ "

CHESTNUT TIES.

Chestnut is cut into railroad, trolley and mine ties. These may be round, sawed or hewn. Round ties are used by mining companies.

Railroad ties usually are $8\frac{1}{2}$ feet in length, trolley ties 7 to 8 feet, and mine ties from 5 to 6 feet. Each company has its own specifications, prices, and methods of piling, which vary to some extent.

DURABILITY.

Chestnut ties are not usually treated with a preservative, but when treated with 10 pounds of creosote per cubic foot the life of the tie is doubled.*

QUALITY OF TIMBER.

Ties must be cut from sound timber, which is free from imperfections which might affect their strength. It does not pay to cut ties from timber under 11 inches in diameter because of the large amount of waste in trees of small diameters.

RAILROAD TIES.

The usual specifications for railroad ties are:

No. 1.

POLE		SQUARED	
Sawed	Hewed	Sawed	Hewed
7 x 7″ x $8\frac{1}{2}'$	7 x 7″ x $8\frac{1}{2}'$	7 x 8″ x $8\frac{1}{2}'$	7 x 8″ x $8\frac{1}{2}'$

No. 2.

POLE		SQUARED	
Sawed	Hewed	Sawed	Hewed
6 x 7″ x $8\frac{1}{2}'$	6 x 7″ x $8\frac{1}{2}'$	7 x 7″ x $8\frac{1}{2}'$	7 x 7″ x $8\frac{1}{2}'$

No. 3.

POLE		SQUARED	
Sawed	Hewed	Sawed	Hewed
5 x 6″ x $8\frac{1}{2}'$	5 x 6″ x $8\frac{1}{2}'$	6 x 6″ x $8\frac{1}{2}'$	6 x 6″ x $8\frac{1}{2}'$

* Bulletin 118, Forest Service.

Tie Volume Table, giving Average Number of Pole Ties (8.5 feet long by 7 by 9 inches) in Trees of Different Heights and Diameters.

D. B. H. Inches	Height in Feet					
	50	60	70	80	90	100
	Number of Ties per Tree					
10	.....	0.7	0.9	1.1	1.2	1.2
11	0.8	1.1	1.3	1.5	1.7	1.8
12	1.3	1.7	2.0	2.3	2.5	2.7
13	1.8	2.3	2.7	3.1	3.5	3.7
14	2.3	2.9	3.4	3.9	4.3	4.5
15	2.7	3.4	4.1	4.7	5.1	5.4
16	2.7	3.5	4.3	5.0	5.6	6.0
17	2.8	3.7	4.6	5.4	6.0	6.4
18	2.8	3.8	4.8	5.7	6.3	6.7
19	2.9	3.9	4.9	5.8	6.5	6.9
20	2.9	4.1	5.1	5.9	6.6	7.1

From Bulletin 10-B, Tennessee Geological Survey.

TROLLEY TIES.

The usual sizes of trolley ties are 6 x 8″ x 8′, 6 x 7″ x 8′, and 6 x 6″ x 8′

The following table gives the number of ties which can be cut from trees of various diameters and heights and the excess of top wood in cubic feet:

TIE VOLUME TABLE, GIVING AVERAGE NUMBER OF TIES (8 feet long by 6 by 8 inches) FROM TREES OF DIFFERENT HEIGHTS AND DIAMETERS.

DIAMETER BREAST-HIGH	HEIGHT IN FEET									
	50		60		70		80		90	
	VOLUME									
	Ties	Top-wood*	Ties	Top-wood	Ties	Top-wood	Ties	Top-wood	Ties	Top-wood
Inches	No.	Cu.Ft.	No.	Cu.Ft.	No.	Cu.Ft.	No.	Cu.Ft.	No.	Cu.Ft.
10	1	9.0	1	10.3	1	11.1	1	10.5	3	9.5
11	1	8.2	1	9.6	2	10.7	2	10.4	4	9.8
12	2	7.5	2	9.0	3	10.4	3	10.3	4	10.1
13	3	6.9	3	8.3	3	9.7	4	10.0	5	10.2
14	3	6.2	3	7.8	5	9.4	5	10.0	8	10.3
15	5	6.1	5	7.6	5	9.3	6	10.0	9	10.7
16	6	6.0	6	7.2	7	9.1	7	10.2	9	11.2
17	.....	.....	6	6.7	8	9.0	8	10.7	10	12.7
18	.....	.....	7	5.9	8	9.2	9	11.5	11	13.5
19	.....	.....	7	5.6	8	9.2	10	12.1	12	15.3
20	.....	.....	8	5.1	10	9.9	11	13.5	13	17.3
21	.....	.....	9	5.1	10	10.3	11	14.7	14	19.4
22	.....	.....	11	4.5	10	10.9	14	16.8	17	21.8
23	.....	.....	12	4.4	12	11.8	14	18.8	17	25.2
24	.....	.....	12	4.7	13	13.2	15	21.6	19	29.1
25	.....	.....	15	4.9	15	14.8	18	24.4	21	34.0

* Topwood down to a diameter of 2 inches.
From U. S. Forest Service, Bulletin 96.

MINE TIES.

Chestnut mine ties may be either flat or round, although chestnut is not favored for the latter. Round ties are notched, the notches being 4 inches wide. These bring about 9 cents delivered.

Both the dimensions and prices for flat ties vary considerably. One thousand ties weigh about 20 tons, and 100 will make a good load for two horses. From 1,000 to 2,000, depending upon size, may be placed in a box car.

The usual sizes are:

6 x 6″ x 6′
5 x 5″ x 6′
6 x 6″ x 5½′
5 x 6″ x 5½′
5 x 5″ x 5½′
4 x 6″ x 5½′
4 x 5″ x 5½′
4 x 4″ x 5½′
3 x 5″ x 5½′
3 x 4″ x 5½′
5 x 5″ x 5′
4 x 5″ x 5′
3 x 4″ x 5′

CHESTNUT FOR CORDWOOD.

Chestnut cordwood is used chiefly in the manufacture of tannin extract and charcoal; also to some extent for fuel.

Tannin Extract.

There are at present between fifteen and twenty establishments in the United States manufacturing tannin extract from chestnut wood. A number of these are located in Pennsylvania.

Chestnut wood contains a higher percentage of tannin than does the bark, differing in this respect from oak and hemlock, the bark of which contains more tannin than the wood. For this reason chestnut wood is used extensively in the manufacture of tannin extract. Some of the extract plants in Pennsylvania use chestnut wood almost exclusively.

Old chestnut wood is richer in tannin than wood from young chestnut trees. Analyses show that there is a higher percentage of tannin in the butt of a tree than in its top; also a higher percentage in dead than in living wood. Chestnut extract wood in the Southern states is largely old or of first growth, and is more profitable in the manufacture of tannin extract than is our Northern or second-growth chestnut, such as is found largely in this State. For this reason the largest and the most profitable extract plants are located in the Southern states.

Chestnut blight does not seem to decrease the per cent. of tannin in the wood. Extract plants accept blighted chestnut as readily as unblighted, or sound wood. The light-colored extract derived from our Northern chestnut is preferred by some tanners to the dark-colored extract made from Southern chestnut.

Specifications of Extract Wood.

Extract wood is purchased either by the standard cord (4 x 4 x 8′ or 128 cubic feet) or the long cord (5 x 4 x 8′ or 160 cubic feet). A cord of 128 cubic feet contains approximately 90 cubic feet of solid wood and 38 cubic feet of air space. A cord of 160 cubic feet contains approximately 128 cubic feet of solid wood. Split wood from large trees is preferred, but extract plants will accept chestnut sticks that are not less than 4 inches in diameter at the small end. A cord of 128 cubic feet usually sells for from $2.50 to $3.00 on board cars at shipping point, and from $3.00 to $3.50 a cord of 160 cubic feet. Wood with the bark on is as readily accepted as wood that has been peeled.

Chestnut Wood for Charcoal.

Chestnut cordwood is used to some extent in the manufacture of charcoal. It may be used pure, or in mixture with other woods. There are two general methods of manufacturing charcoal—the kiln process and the retort process.

Charcoal is used in a number of industries, among which are glass plants and iron furnaces. Considerable quantities are used by railroads for cooking in dining cars, and it is also used to some extent in restaurants.

Chestnut Wood for Fuel.

This wood is not very desirable for use in open fireplaces, because of its tendency to throw out sparks. Its heating value is less than oak or hickory, and where these woods are available, chestnut is used

very little. It produces an excellent kindling wood, and is used to some extent for this purpose, in mixture with other woods. In certain parts of the State large quantities of chestnut are used in burning limestone. Because of its rather mild heat, it is used for tempering glass, and is particularly desirable for annealing brass, being for this purpose better than any of our other woods. Some iron furnaces use small quantities each year for kindling fires.

Special Tariff on Blighted Chestnut Cordwood.

The Pennsylvania Railroad has issued a special tariff on blighted chestnut cordwood which will aid timber owners in marketing this cordwood at a profit. The minimum rate in this tariff is 35 cents, and the maximum $1.00 per ton. This rate can be applied only upon shipments of cordwood entirely within the state.

PENNSYLVANIA RAILROAD COMPANY

NORTHERN CENTRAL RAILWAY COMPANY

PHILADELPHIA, BALTIMORE & WASHINGTON RAILROAD COMPANY

WEST JERSEY & SEASHORE RAILROAD COMPANY

LOCAL FREIGHT TARIFF

—ON—

BLIGHTED CHESTNUT CORD WOOD

CARLOADS

—TO AND FROM—

ALL STATIONS ON PENNSYLVANIA RAILROAD

EXCEPT BRADFORD, EAST BRADFORD AND MARTIN'S CREEK, PA.

IN STATE OF PENNSYLVANIA

Governed, except as otherwise provided herein, by the Official Classification, I. C. C.—O. C. No. 38 (F. S. Holbrook, Agent), supplements thereto and reissues thereof; and by Exceptions to said Classification, G. O.—I. C. C. No. 3774, supplements thereto and reissues thereof.

TABLE OF RATES.

The following rates will be applied to and from stations on the Pennsylvania Railroad, as provided on this page, for movement wholly within the State of Pennsylvania, and lists of stations and mileages will be ascertained by reference to G. O.—I. C. C. No. 3800 (G. O. No. 402), supplements thereto and reissues thereof.

MILES	RATES
1 to 70 inclusive	35 cents per 2000 pounds.
71 to 80 "	40 " " " "
81 to 90 "	45 " " " "
91 to 100 "	50 " " " "
101 to 110 "	55 " " " "
111 to 120 "	60 " " " "
121 to 130 "	65 " " " "
131 to 140 "	70 " " " "
141 to 150 "	75 " " " "
151 to 160 "	80 " " " "
161 to 170 "	85 " " " "
171 to 180 "	90 " " " "
181 to 190 "	95 " " " "
191 to 272 "	100 " " " "

This tariff has not been filed with the Interstate Commerce Commission, as it is intended to be applied only on traffic entirely within the State of Pennsylvania, and the rates contained herein must not be used to or from any junction points with connecting lines.

ISSUED JUNE 19, 1912, BY GEO. D. OGDEN,
General Freight Agent,
Philadelphia, Pa.

EFFECTIVE JUNE 19, 1912

[OVER]

RULES GOVERNING THE TARIFF.

CERTIFICATE OF INSPECTION.

With the forwarding of the first shipment the shipper will file with the agent a certificate, such as provided for below, which certificate may be used for subsequent shipments by the same shipper up to and including the number of cords of wood covered by such certificate, record of which will be indicated on the certificate as each shipment offers, showing waybill reference, car number or numbers, number of cords and destination of each shipment.

COMMONWEALTH OF PENNSYLVANIA.

THE COMMISSION FOR THE INVESTIGATION AND CONTROL OF THE CHESTNUT TREE BLIGHT DISEASE IN PENNSYLVANIA.

Certificate of Inspection.

This is to certify that I have examined.....cords of chestnut wood on the property owned by.....at..... and have found the same to be infected with Chestnut Blight, caused by the fungus Diaporthe parasitica, and entitled to be shipped as blighted chestnut wood.

Dated.....191.....at.....Pa.

.....Inspector,

For the Chestnut Tree Blight Commission.

Shipped.....cords of the above-mentioned wood in car.....

Shipped.....cords of the above-mentioned wood in car.....

(Signed)

.....Station Agent.

CHESTNUT FOR FENCING.

Chestnut is the post-and-rail timber of Pennsylvania. Chestnut posts are either round, hewn on one side, rough-split, split and hewn, or they may be sawed. Rails may be used round, but are usually split. Posts intended for wire or board fences are used solid, while posts for rail fences are usually mortised, each post containing from two to five holes, to receive the ends of rails.

Cost of Manufacture.

The cost of making fence posts depends on the size of chestnut timber, and the labor. Rails are 11 feet long, usually split and pointed at both ends, when used in mortised posts.

Facts about Posts; the Result of Investigation.

Chestnut posts in actual use, when compared with good quality of white-oak posts, used under the same conditions, show a higher per cent. of durability than the best white oak.

A large post usually lasts longer than a small one of the same wood.

Decay proceeds with equal rapidity whether the post is set with the large end down, in the position the tree grew, or reversed, with the small end down. Therefore, the larger or sounder end should receive preference.

In stiff clay soil the posts rot principally just beneath the top of the ground, and in the porous sandy or gravelly soil they usually rot from the top of the soil all the way down; the effect is the same in both cases.

In soil that is full of water all the time, posts will last longer. It is the alternating between wet and dry that causes decay.

It seems that seasoning has little effect on the durability.

Table Showing Number of Hewed and Round Posts Obtainable From Forest-Grown Chestnut Timber.

Diameter Breast-high	Number of 7-Foot Cuts	Number of Posts		Total Number of Posts
		Split	Round	
7	1	----------	1	1
8	1	----------	1	1
9	2	----------	2	2
10	3	2	2	4
11	5	4	3	7
12	5	8	2	10
13	6	11	2	13
14	7	15	2	17
15	8	20	2	22
16	9	24	2	26
17	10	28	2	30
18	10	33	1	34
19	11	37	1	38
20	11	42	1	43
21	11	46	1	47

Note.—Data compiled from actual measurements of 150 trees.

CHESTNUT FOR SLACK COOPERAGE.

STAVES.

Chestnut is manufactured into slack cooperage stock for the manufacture of barrels and kegs, to hold such commodities as nails, lime, cement, fruit, etc. For staves it is particularly desirable. It is sometimes cut into hoops. Timber which is four inches in diameter and up may be used, and that from six to ten inches is preferable. Large, loose knots only are objectionable.

Stave timber is either cut in the woods into small logs or bolts, which have approximately the same length as the staves to be cut from them, or it may be brought in as long logs and sawed into these lengths at the mill. Nail-keg staves are 18 inches long and 3 to 5 inches wide, while barrel staves are 28 inches long and about the same width. Bolts for keg staves are 19 inches and up in length, and those for barrels about 30 inches. Keg staves are packed in bundles of 100 for shipment, and barrel staves in bundles of 50.

The cost of a stave mill of 12,000 daily capacity of ten hours is from $1,500 to $1,750. To operate such a mill requires seven or eight men, only three of which need to be skilled. A power plant which will develop 25 horsepower is required.

A cord of 160 cubic feet will produce 2,000 keg staves.

Timber which will produce 1,000 board feet will make 5,000 keg staves, and approximately 2,500 barrel staves. One cord of bolts, with the bark, will make 1,000, or, without the bark, 1,200 barrel staves.

Heading.

An ordinary slack cooperage barrel has a head diameter of 17 inches. Chestnut which is of sufficient size is very suitable for this purpose.

Hoops.

Some chestnut was used for hoops in 1907, but none was reported as being used for this purpose in 1909. This may be attributed to the fact that wire hoops have to a large extent replaced wooden hoops in slack cooperage.

CHESTNUT FOR SHINGLES.

Chestnut shingles may be split or sawed. Owing to the scarcity of good quality straight-grained chestnut, and to the development of shingle-sawing machinery, split shingles have fallen into disuse. Sawn chestnut shingles are usually 4 inches wide, $\frac{1}{16}$ inch thick at small end, $\frac{1}{2}$ inch thick at the butt end, 16, 18 or 24 inches in length They are usually sold in bundles containing 250 shingles. Four bundles, or one thousand shingles, will lay about one "square." A square is 10 feet on each side, or 100 square feet. Shingles are laid about one-third to the weather.

Durability.

No. 1 chestnut shingles on a roof of $\frac{1}{3}$ pitch or more should last about twenty years. Chestnut shingles are inclined to leak after a short time, around the nails, due to the corroding action of the tannin in the wood upon the iron in the nail. No. 1 chestnut shingles are next in durability to No. 1 white pine or to cedar shingles.

Quality of Timber.

Chestnut for shingles is sawn into bolts or blocks the exact length of the shingles to be made. For this reason shingles may be cut from chestnut which is too crooked or too short for lumber or poles, so long as the wood is reasonably clear of defects.

TO FIND THE VOLUME OF STANDING TREES.

A "rule of thumb" for estimating tall, sound trees by the Doyle rule is as follows: Volume in board feet equals $\frac{3}{2}$ of the square of the diameter, breast high; for example, a tree 20 inches in diameter, breast high, contains 600 feet board measure.

A more accurate rule is as follows: From the diameter of the log in inches (at the top inside bark), substract 4 for the slabs; then multiply the remainder by half itself and the product by the length of the log, in feet, and divide the result by 8.

VOLUME IN BOARD FEET OF CHESTNUT BY THE DOYLE-SCRIBNER RULE, SOUTHERN APPALACHIAN REGION.

D. B. H. INCHES	HEIGHT OF TREE IN FEET					
	50	60	70	80	90	100
	VOLUME IN BOARD FEET					
12	30	35	40	50	55	65
13	35	45	55	60	75	85
14	45	55	65	75	90	100
15	55	65	75	90	105	120
16	65	80	90	105	125	145
17	80	95	110	125	145	170
18	95	110	125	145	165	195
19	110	125	145	165	190	225
20	125	145	165	185	215	255
21	145	165	190	210	240	290
22	165	185	210	235	270	325
23	185	205	235	260	305	360
24	205	230	260	290	340	400
25	225	255	285	320	380	440
26	250	280	315	335	420	485
27	275	305	345	395	460	530
28	300	335	380	435	505	580
29	320	360	410	480	555	630
30	345	390	445	520	600	685
31	370	420	480	565	650	745
32	390	450	520	605	700	810
33			555	640	755	875
34				680	805	940
35				715	860	1010
36				750	910	1080

U. S. Forest Service, Bulletin 36.

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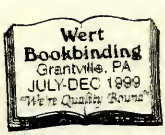
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